

A TECHNIQUE FOR THE CLIENT-CENTRED EVALUATION OF ELECTRONIC ASSISTIVE TECHNOLOGY

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Electronic Assistive Technology (EAT) provides assistance and assurance for an increasing number of elderly and disabled people who wish to live independently. The technique described here aims to optimise the use of EAT by ensuring that it impedes as few aspects of everyday life as possible. The Post Installation Technique (PIT) is designed to be used by people with little technical or human factors knowledge to provide a client-centred evaluation of a recently installed EAT application. It systematically probes for aspects of their daily life that have been negatively affected by the technology. These problems are prioritised and passed to the EAT service provider so that it can be better tailored to client's needs.

This paper describes the development of the PIT through application in two small field studies and an expert evaluation.

Introduction

The potential benefit of assistive technologies to increase the quality of care of older people and reduce the associated costs is widely accepted within the UK (The Audit Commission, 2004). Electronic Assistive Technology (EAT) is increasingly used to enable older and disabled people—clients—to live independently in their own homes. Clients' are assessed on their ability to perform routine daily activities, such as eating, bathing, and moving around, to determine if EAT could help them. The provision of EAT is often technology-led, however, rather than needs-led (Sixsmith & Sixsmith, 2000). Although the prescribed EAT may make it easier or give clients more confidence to do some activities, after installation it may not properly support the task at hand—e.g., window opener switches located nowhere near the relevant window—and it can adversely affect other tasks in ways that are irritating, or problematic, and are not immediately obvious. When a client washes their kitchen floor, for example, they need to move the flood sensors beforehand—to avoid a false alarm—and remember to replace them afterwards. Such small details can affect the successful operation of the overall system.

Solving the problems described above requires a detailed knowledge of the minutiae of the client's everyday life. The obvious person to provide this knowledge is the client, although they cannot be expected to have a deep understanding of the technological constraints. In a post installation evaluation, however, this is not necessary. The client can provide details of any aspects of their daily life that have been negatively affected by the EAT which can then be passed to the EAT provider to make appropriate adjustments.

Instantiating the risk management framework

The Post Installation Technique (PIT) is an instantiation of a framework for investigating the risks of introducing and using technology in the home (Monk et al., Accepted for publication). The framework gives social and psychological harms the same level of importance as physical harms (injury, cost and so on.). The risk is assessed by considering the likelihood of occurrence (*high, medium, low*) of a generic harm (*injury, untreated medical condition, physical deterioration, dependency, loneliness, fear or costs*) arising from everyday activities, and the generic consequences of that harm (*distress, loss of confidence, a need for medical treatment, death*). The importance of the harm (e.g., injury) is conditioned by its consequences (e.g., distress, medical treatment).

The PIT allows clients (possibly with the help of a carer) to systematically consider how EAT affects their everyday living. It embodies a client-centred approach, identifying problems from the client's point of view in a four step process.

Step 1 lists the EAT installed in the client's home. This list of equipment determines which checklist type questions are asked in Step 2, to elicit the benefits and problems of the EAT when clients perform everyday activities. The client simply ticks the appropriate box for each question.

Once all the relevant questions have been answered, Step 3 summarises the benefits, and details the problems for further analysis. For each problem the client: selects the potential generic harm that could result from the problem; assesses the chances of that harm occurring; and decides what the consequences of that harm might be. Clients are also asked where the problem arises and how important it is to fix it.

In Step 4 clients suggest how they would like to see each of the problems solved. The completed forms are then handed on, nominally to the EAT service provider, for action.

Evaluating the post installation technique

The PIT is being iteratively developed and has been evaluated three times so far. For the first and third evaluations the PIT was used with clients in the field; for the second a semi-structured interview technique was used during an expert review of the PIT.

Field study 1: West Lothian

The PIT was initially trialled in West Lothian with three participants, all elderly females. The purpose of the visit and the PIT questionnaire were first explained to the client, before asking the questions in the order that they appear in the questionnaire.

The first participant lived in her own flat, and used a walking stick to get around her home. She had had EAT installed for about a month, and mainly used the carephone to set the security alarm when she went out. She had had one false alarm which she had cancelled without any problem.

The second participant lived in her own sheltered accommodation flat. She could walk a little using a Zimmer frame, but generally used a wheelchair. The EAT had been installed for just over a year when the client moved into the flat.

The third participant lived in her own home, and had limited mobility. She had had EAT installed since September 2003, but had had similar equipment installed in her previous house. She had had a couple of false alarms (once when her granddaughter leant on the pendant button, and once when she burnt the toast!).

Results and discussion

No problems with the EAT were uncovered, but the interviews revealed some problems with the PIT. The main problem concerned the original intention of working through the PIT walking round the home with the client. The mobility problems of the clients in West Lothian suggests that this may often not be a viable option.

The PIT systematically poses simple (yes/no) questions to identify problems. Without a full appreciation of the bigger picture, however, clients were concerned about the correctness and usefulness of their answers. They often answered in general terms, rather than focusing on specific activities and particular technology in a particular room.

Just having the EAT made all the clients feel more safe and secure. Even though no problems were identified for these clients, discussions with the support worker highlighted the existence of problems with EAT, such as extreme temperature sensors placed too close to the cooker, and the potential problem of clients falling if they rush to get to the carephone to clear any false alarms within the 15 second time limit.

The PIT was changed so that clients do not have to walk around the house. The structure and purposes were made clearer to the clients by revising the preamble for the PIT. The questions were also amended to focus first on client activities, and then on the room(s) where they are performed.

In addition, the last three questions in each section, which related to the aesthetics and general defectiveness of the system, were placed into a single general section at the start of the PIT. Getting these general issues out of the way first should help clients to focus their attention better on the specific issues raised in subsequent questions.

Expert review: Belfast

Copies of the PIT were passed to a service manager from Belfast. This was followed up with a semi-structured interview focusing on the PIT and the assessment process that they used

After installation a follow-up visit is conducted about two weeks later, mainly to check that clients understand how to use the EAT. The other purpose is to identify any initial problems such as sensors that need to be relocated, or to add extra devices to the system. It is rare for any devices to be removed at this stage: assessors try to persuade clients to at least attempt to work with the EAT. Further reassessments are carried out at six month intervals. As part of the process, a record for each installed system is kept, covering: the client's call history; which sensor initiated any call; what type of response was generated; and details of any system maintenance or upgrades.

The service manager suggested that clients would respond better if questions were asked face to face, rather than having them complete the forms themselves. The multi-part questions were regarded as a little too long, and could possibly be reduced to two or three parts. It was also pointed out that questions about washing and toileting will have been asked during the original assessment; it may be a bit too personal to ask clients about them again.

It was felt that the PIT could be useful during the six monthly reassessments. The listed categories of harm, chances of harm and possible consequences could also be used with their existing assessment process. More generally, it was suggested that some of the material from the PIT could be used in training staff.

The preamble to the PIT was revised to make it clear that only the relevant parts of questions should be answered. The answer boxes for the questions were also flagged as relating to either Benefits or Problems, to make it clearer which form they should be copied to for step 3 of the PIT.

Field study 2: Durham

The first client had a basic EAT package installed in her home, and had recently been given a fall detector, and a bed sensor with a lamp attached. She had stopped wearing the fall detector—a common problem, especially among women—and had instead become more reliant on her pendant, wearing it all the time. She had had a couple of problems with the carephone. One was attributed to a fault on the line, although none were found subsequently. The other was its loudness when the phone dials through to the call centre. Any other problems appeared to be isolated incidents, often light-heartedly dismissed by the client, apart from the bed sensor which she said could be removed as far as she was concerned. The second part of the interview therefore focused solely on this issue.

The first problem was that the lamp never came on when she got out of bed in the night; she had resorted to using the bedroom light instead. The second problem was that the client did not think that the sensor was working. She reported that the device had been programmed for her being in bed by midnight. One night, however, she said she was sat in her living room at 12:15 and no alarm was ever raised.

The second client had a trial lifestyle monitoring system installed (in August 2004). Such systems collect data from strategically placed sensors and upload them for analysis so that inferences can be made about the client's state of health. She identified four problems with the system. The first two are really installation problems (making sure that sensors are securely fitted so that they cannot be dislodged accidentally or otherwise by the client or their pet(s), and making sure that door sensors are fitted to doors that are likely to be regularly opened by clients). Such problems can easily be avoided by talking more to the clients prior to installation.

The third problem was that the electrical plugs for the equipment are large and heavy. The fourth problem was that the flood detector was not properly sensing when a flood occurred, because it was not positioned on a level floor. These two problems are more indicative of possible design flaws that would have to be addressed by the equipment manufacturer, although the client viewed them as irritants, rather than major problems.

The client had also had problems with the bed sensor failing to detect that she did not get up during a period of illness. This was attributed to the device's timing parameters having been incorrectly set.

Results and discussion

This was the first time the PIT had been used in analysing the identified problems, and it uncovered some shortcomings in how the client does this. The main concern is how the PIT deals with harms and the likelihood of harm. In industrial risk assessment methods, such as HAZOP (Kletz, 1999), the harms and the associated likelihood of those harms occurring are assessed by a panel of qualified experts. The client-centred nature of the PIT means that judgements about possible harms and the likelihood of the occurrence of those harms are made by the client (and carer).

The first client was very explicit about the difficulty of determining the likelihood of the harm occurring, saying, "Your guess is as good as mine, dear." The second client mostly regarded the problems as largely unquantifiable irritants, although she had deeper concerns about the problem with the electrical plugs. A better method is therefore needed to enable the client (and carer) to appropriately assess the likelihood of harms occurring.

In thinking about the problems, the clients seemed to focus on a specific incident. One-off incidents may be perceived as temporary glitches, whereas persistent incidents are more likely to be considered *real* problems. Clients may still not be able to express the likelihood of the identified harm occurring, however. The PIT was therefore revised to ask clients to focus on their personal experiences to identify any real harms that have been "caused" by the equipment. Clients are now also asked to consider whether anything worse could happen given the same problem, e.g., "What do you think is the worst thing that could happen to you if this problem happened again?"

The problem of identifying the likelihood of harm was rephrased to reflect the client's personal experiences. So clients are now asked how often the problem has arisen or does arise (Does the problem arise daily/weekly/monthly? and so on.). This can subsequently be translated into a qualitative equivalent (high, medium and low).

Summary and future work

Our experiences of developing the PIT to date suggest that it is a useful and worthwhile exercise. The PIT was designed to be used either as a standalone instrument, or as part of the client reassessment process. Most EAT service providers routinely reassess clients approximately six months after installation. One service provider has already expressed interest in using the PIT as part of this reassessment.

Evaluating the PIT has been a lengthy process. The main reason for this is the need for access to suitable clients with appropriate EAT. This often requires delicate negotiations with care providers or social services. Although clients should ideally be randomly selected, opinionated and loquacious clients tend to provide more extensive feedback on the EAT and the PIT, which helps to improve both.

Whilst the PIT has proved to be useful for identifying and analysing benefits and problems of EAT, further evaluation is required to test out the latest revisions which should improve the analysis of problems in particular. Once the PIT reaches a steady state, the intention is to release it for use by clients. The latest revision of the PIT can be downloaded from <http://www-users.york.ac.uk/~am1/ftpable.html>.

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